FIG. 1

Eq. 5:

$$\frac{\partial C_i}{\partial \sigma} = \left(\frac{1}{R}\right) \times \left[p \frac{\partial C_{i+1}^{UP}}{\partial \sigma} + (1-p) \frac{\partial C_{i+1}^{DOWN}}{\partial \sigma} + \left(C_{i+1}^{UP} - C_{i+1}^{DOWN}\right) \frac{\partial p}{\partial \sigma} \right]$$

i.e.

$$V_i = \left(\frac{1}{R}\right) \times \left[p V_{i+1}^{UP} + (1-p) V_{i+1}^{DOWN} + \left(C_{i+1}^{UP} - C_{i+1}^{DOWN}\right) \frac{\partial p}{\partial \sigma} \right]$$

where $\frac{\partial p}{\partial \sigma}$ can be computed from the defn. of risk neutral probability "p".

Eq. 6: $V_i = \frac{\partial S_i}{\partial \sigma}$